

## **REMARKS**

By the *Office Action* of 4 June 2007 marked final, Claims 1-17 and 21 are pending in the Application, and all rejected. Applicant and Applicant's counsel thank the Examiner with appreciation for the careful examination. By the present *Response and Amendment After Final Rejection*, the Applicant amends all pending independent Claims 1, 12, and 21.

No new matter is believed introduced by the present *Response and Amendment After Final Rejection*. It is respectfully submitted that the present Application is in condition for allowance for the following reasons.

### **1. Rejection Of Claim 1 Under 35 USC § 103**

The Examiner rejects Claim 1 under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 5,029,805 to Albarda et al. in view of U.S. Patent Publication No. 2006/0044088 to Vaitkus et al. This ground of rejection is believed overcome by the clarifying amendments to Claim 1, as the combination of these references does not teach or suggest, for example, (i) an actuator locatable in a **fluid** flow path formed on a single substrate with an integrated circuit nor (ii) an actuator with a membrane capable of maintaining at least three positions.

The Examiner states that Albarda et al. discloses a valve arrangement in which a membrane is capable of moving between a first position, in which flow is inhibited through a flow path, and a second position enabling flow through the flow path. The Examiner concedes that "Albarda et al. fails to teach that there is an integrated circuit on the substrate." (*Office Action*, p. 5). The Examiner contends, however, that Vaitkus et al. discloses a switch that can be integrated on the same substrate with other electrical devices. The Vaitkus et al. application, however, concerns micromagnetic switches, while Applicant's Claim 1 now recites an actuator locatable in a **fluid** flow path. Applicant amends Claim 1 to further clarify that Applicant's actuator is a locatable in a **fluid** flow path and is capable of enabling and inhibiting "**fluid** flow through the **fluid** flow path." (Amended Claim 1).

The switch of Vaitkus et al. is an **electrical switch**, while Applicant's actuator is a microvalve. It is well known in the prior art to place electrical components like the electrical switch of Vaitkus et al. on the same single substrate as an integrated circuit. Vaitkus et al., however, is silent as to a method or system to fabricate a microvalve on the same substrate as an integrated circuit.

Furthermore, neither Albarda et al. nor Vaitkus et al. teach an actuator locatable in a fluid flow path having a membrane capable of maintaining at least three positions. The clarifying amendments to Claim 1 provide that the membrane of the actuator is “capable of moving through a first position ~~and~~, a second position, **and an intermediate position.**” (Amended Claim 1). In this intermediate position, the membrane enables “**partial fluid flow through the fluid flow path.**” (Amended Claim 1). In other words, the membrane activating mechanism can enable the membrane to move to a position that is not fully open or fully closed. As fully and completely described in the *Specification*, the ability of the membrane to maintain more than just an open and a closed position provides many advantages, including (i) permitting control of the volume flow rate for the actuator, (ii) enabling applications which “are very useful for drug delivery and fluidic mixing, (iii) for certain embodiments, enabling a modulating pump by “applying a modulating current and a certain lagging time between the top and bottom coils.” (*Specification* at paragraphs [196], [197], and [200]). In contrast to Applicant’s claimed invention, the actuator of Albarda et al. and the switch of Vaitkus et al. have only an opened and closed position.

Neither of the cited references alone, nor their combination, anticipate, disclose, teach, or suggest what Applicant claims herein. Thus, it is respectfully submitted that Claim 1 is allowable, and all claims depending on Claim 1, Claims 2-11, are also allowable.

## **2. Rejection Of Claims 1-7 and 10-17 Under 35 USC § 103**

The Examiner rejects Claims 1-7 and 10-17 under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 6,123,316 to Biegelsen et al. in view of Albarda et al., and further in view of Vaitkus et al. This ground of rejection is believed overcome by the clarifying amendments to Claims 1 and 12, as the combination of these references does not teach or suggest, for example, (i) an actuator locatable in a **fluid** flow path formed on a single substrate with an integrated circuit or (ii) an actuator with a membrane capable of maintaining at least three positions.

Similar to independent Claim 1, independent Claim 12 has been amended to further clarify that Applicant’s actuator is a locatable in a **fluid** flow path and is capable of enabling and inhibiting “**fluid** flow through the **fluid** flow path.” (Amended Claim 12). Furthermore, the clarifying amendments to Claims 1 and 12 provide that the membrane of the actuator is “capable of moving through a first position, a second position, **and an intermediate position.**” (Amended Claim 12). In this intermediate position, the membrane enables “**partial fluid flow through the fluid flow path.**” (Amended Claim 12). The failure of to Albarda et al. and

Vaitkus et al. teach an actuator locatable in a fluid flow path formed on a single substrate with an integrated circuit is not remedied by Biegelsen et al.

The art is replete with references illustrating that low power, quick response time, and CMOS capability of the actuator in Applicant's independent Claims 1 and 12 were unreachable prior to the present invention. Neither the cited references, alone, nor their combination, anticipate, disclose, teach, or suggest what Applicant claims herein. Thus, it is respectfully submitted that Claims 1 and 12 are allowable, and all claims depending on Claims 1 and 12, Claims 2-11 and 13-17, are also allowable.

**3. Rejection Of Claims 8-9, 14-17, and 21 Under 35 USC § 103**

The Examiner rejects Claims 8-9, 14-17, and 21 under 35 U.S.C. §103(a) as being obvious over Biegelsen et al. in view U.S. Patent No. 5,475,353 to Roshen et al. Applicant respectfully traverses this rejection. In view of the clarifying amendments to the independent claims from which Claims 8-9 and 14-17 depend and the clarifying amendments to Claim 21, these grounds of rejection are believed overcome. More particularly, Roshen et al. does not remedy the failure of Biegelsen et al. to teach Applicant's an actuator locatable in a **fluid** flow path formed on a single substrate with an integrated circuit and having a membrane capable of maintaining at least three positions.

**4. Fees**

No Claim fees are believed due. The number of Claims pending remains less than those filed. Further, this *Response* is being filed within two months of the *Office Action*. Thus, it is believed no extension of time fees are due. Nonetheless, should any fees be due, authorization to charge deposit account No. 20-1507 is hereby given.

## **CONCLUSION**

By the present *Response and Amendment After Final*, the Application has been in placed in full condition for allowance. Accordingly, Applicant respectfully requests early and favorable action. Should the Examiner have any further questions or reservations, the Examiner is invited to telephone the undersigned Attorney at 404.885.3695.

Respectfully submitted,

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I hereby certify that this correspondence is being submitted by e-filing to the Patent and Trademark Office in accordance with §1.8 on this date via the EFS-Web electronic filing system.

/trentonaward59157/

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Troutman Sanders LLP  
Bank of America Plaza  
600 Peachtree Street, N.E., Suite 5200  
Atlanta, Georgia 30308-2216  
United States  
Phone: 404.885.3695  
Fax: 404.962.6818

/trentonaward59157/

Trenton A. Ward  
Registration No. 59,157